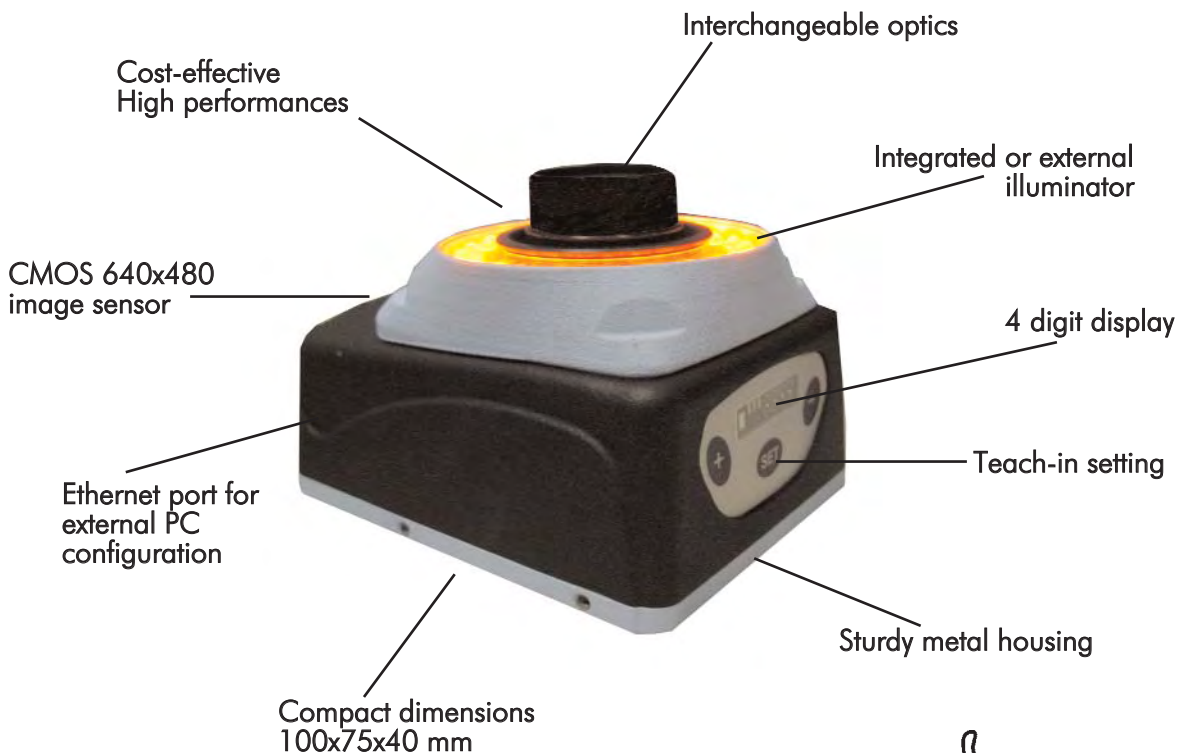


## INTELLIGENT SMART CAMERA SENSORS FOR ARTIFICIAL VISION



The **SCS1** Smart Camera offers the vision system functions, with the simplicity, dimensions and prices of an advanced sensors.

Applications including multiple measurements, the control of surfaces and object positions are successfully satisfied. The new 'Identification' models offer code reading and control functions as well as OCR/OCV, BarCode and DataMatrix.

The illuminator can be integrated or external. The sensor can be configured and function in the 'stand-alone' mode thanks to the built-in keyboard and display, or connected to a Host PC through the Ethernet port.

Two PNP outputs, activated according to the inspection, configurable inputs and RS232 or RS485 serial interfaces are present on the standard M12 connector. The standard CS of C-mount optics are interchangeable



# SCS1 COMPACT SMART CAMERA SENSORS

SCS1 features the most advanced image inspection technologies available today:

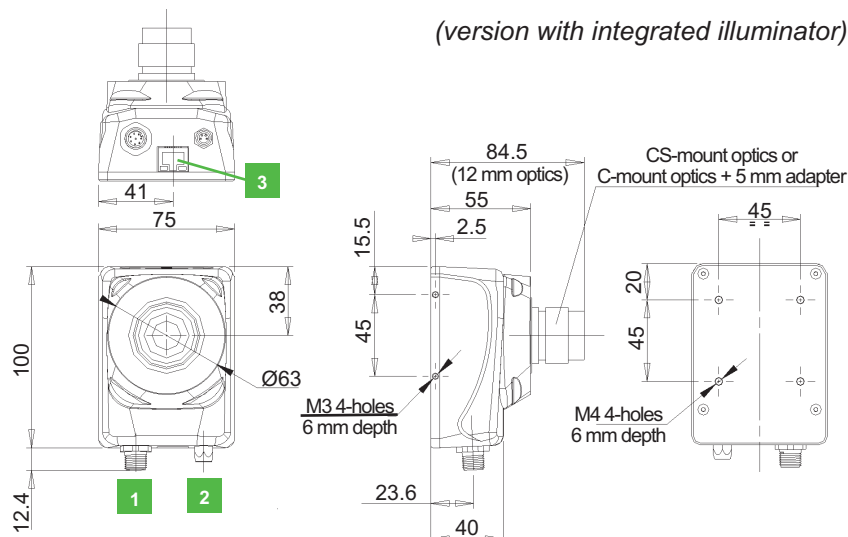
**contour matching:** recognises shape and number of pixel of the target object's perimeter;

**blob analysis:** detects the number of pixel of the target object's area;

**pattern matching:** recognises a template inside the target image according to its chromatic greyscale surface characteristics.

Contour and blob operating modes use binary black and white elaboration, while pattern matching works according to greyscale elaboration.

## DIMENSIONS



External illuminator (ring light model)

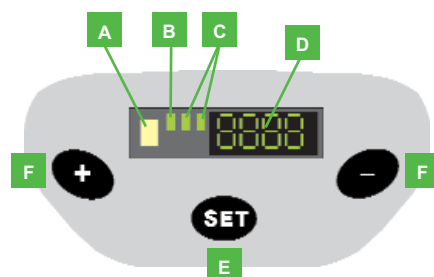


Integrated illuminator

## CONNECTOR LAYOUT

- 1 M12 8-pole I/O connector
- 2 M8 4-pole lighting connector
- 3 RJ45 Ethernet connector

## INDICATORS AND SETTINGS



- A Output 1 status LED
- B Output 2 status LED
- C Digital inputs status
- D 4-digit display
- E SET push-button
- F +/- selection push-buttons

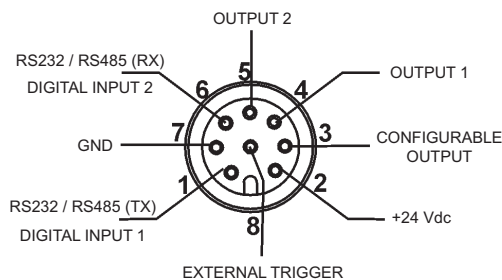
## ACCESSORIES

For dedicated accessories refer to the **ACCESSORIES** section of this catalogue.



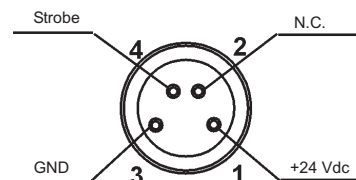
## CONNECTIONS

### M12 8-POLE CONNECTOR



- 1 = white = RS232 / RS485 (TX) / Digital input 1
- 2 = brown = 24 Vdc
- 3 = green = Configurable output
- 4 = yellow = Output 1
- 5 = grey = Output 2
- 6 = pink = RS232 / RS485 (RX) / Digital input 2
- 7 = blue = GND
- 8 = red = External trigger signal input

### M8 4-POLE CONNECTOR



- 1 = brown = +24 Vdc
- 2 = white = Not connected
- 3 = blue = GND
- 4 = black = Strobe TTL signal





## TECHNICAL DATA

<b>Power supply:</b>	24 Vcc ± 10% <sup>1</sup>
<b>Ripple:</b>	2 Vpp max
<b>Consumption:</b>	120 mA at 24 Vdc
<b>Integrated illuminator:</b>	ring illuminator, continuous red light
<b>Output type:</b>	2 PNP - NO
<b>Output current:</b>	100 mA max
<b>Saturation voltage:</b>	2 V
<b>Serial interface:</b>	RS232, 115200, 8 N 1 <sup>3</sup> RS485, 115200, 8 N 1 <sup>3</sup>
<b>Aux inputs:</b>	2 digital <sup>3</sup> Trigger signal
<b>Network interface:</b>	Ethernet 10/100 Mbps
<b>Image sensor:</b>	CMOS 6.61mmx4.97mm 640x480 pixels resolution (VGA) 9.9 μm pixel dimension
<b>Lenses:</b>	12 mm CS-mount or C-mount with ring adapter 12 mm focal length
<b>Electronic shutter:</b>	yes
<b>Response time:</b>	refer to 'inspection time' paragraph
<b>Setting:</b>	SET push-button + and - push-buttons auxiliary PC graphic user interface
<b>Indicators:</b>	4 digit display 3 green LEDs 1 yellow OUTPUT LED
<b>Connections:</b>	RJ45 Ethernet connection M12 8-pole I/O connector M8 4-pole external light connector
<b>Electronic protection:</b>	class 2
<b>Mechanical protection:</b>	IP40
<b>Protection devices:</b>	A, B <sup>2</sup>
<b>Housing material:</b>	aluminium alloy
<b>Weight:</b>	300 g without illuminator 385 g with integrated illuminator
<b>Operating temperature:</b>	-10 ... +55°C
<b>Storage temperature:</b>	-25 ... +70°C

## TECHNICAL NOTES

- <sup>1</sup> Limit values
- <sup>2</sup> A - reverse polarity protection  
B - overload and short-circuit protection
- <sup>3</sup> Models available with RS232, RS485 or 2 digital inputs

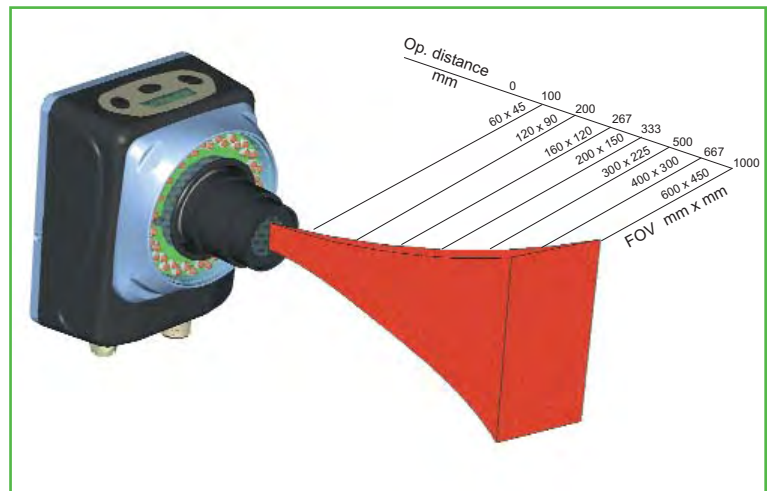


## LENS ADJUSTMENT



The lens presents two adjustments: one for diaphragm regulation (shutter) and the other for focus.

## INSPECTION DIAGRAMS



Operating distance - inspection area (FOV)  
(12 mm optics)

## INSPECTION TIME

Inspection time is the time between image acquisition and digital output switching. It includes exposition time, acquisition time and elaboration time. Exposition time depends on target object speed, inspection frequency and lighting. Acquisition time is about 30 ms in case of a full 640 x 480 image (can be reduced inspecting only a portion of the field of view). Finally, elaboration time depends on the number of tools used in the inspection programme and on image characteristics.



## USEasy™ PC GRAPHIC USER INTERFACE SETTING

The PC graphic user interface configures the inspection programme, using a series of tools to apply directly on the reference image with an easy mouse-pointing and click approach.

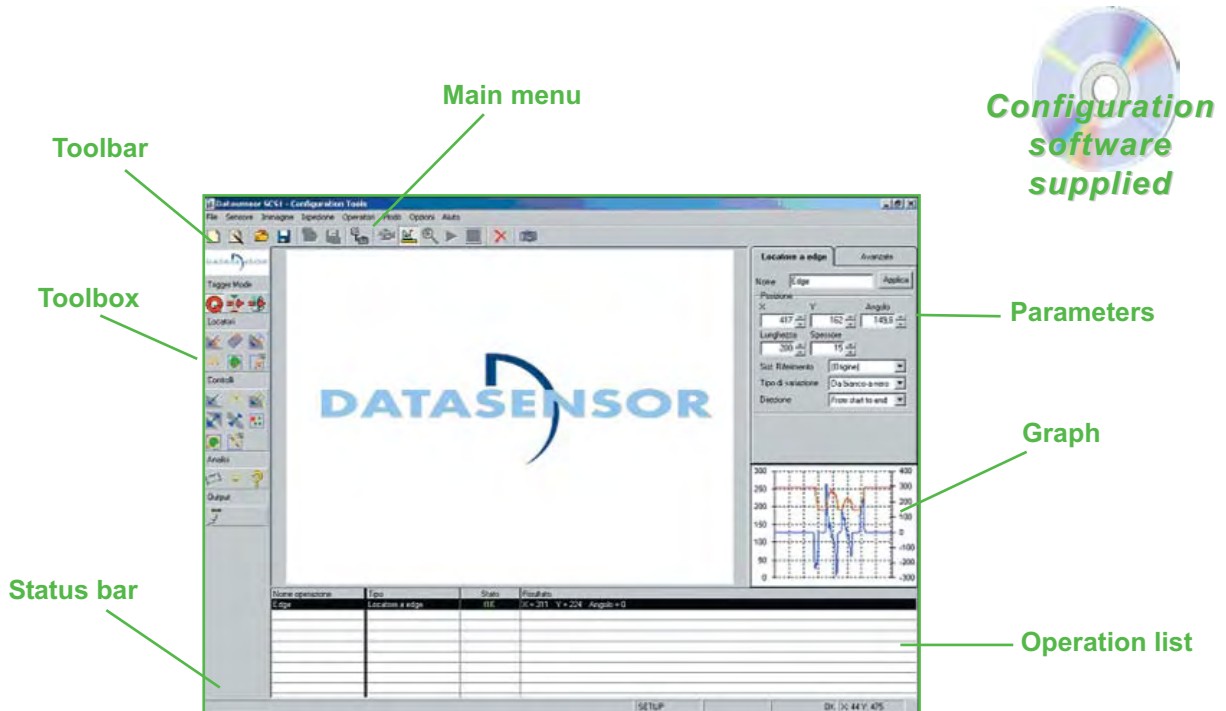
These tools are divided into 3 categories: locators, analysis and test tools.

The locators are usually the first to be used as they 'find' the object to inspect on the viewed area.

Analysis tools are the more application-orientated, for example they permit to find edges, measure distances between lines or edges, object counting and so on.

Finally, test tools condition the activation of the switching outputs according to the inspection results.

The following picture shows the PC graphic user interface of the setting software supplied with the **SCS1**.



Configuration software supplied

Main menu

Toolbar

Toolbox

Status bar

Parameters

Graph

Operation list

Nome operazione	Tipi	Stato	Posizione
Edge	Locatore a edge	OK	X=211 Y=204 Angolo=0



## STAND ALONE TEACH-IN SETTING PROCEDURE

The main steps for an inspection configuration, using the push-buttons and 4-digit display, are the following:

1. Inspection parameter setting
2. Teach-in of the target and its background
3. Inspection memorisation and starting operations

The menu options can be visualised using the + and - push-buttons, while SET is used to select an option and to open the relative submenu.

SETP

**Setup:** allows to access the parameters that control sensor functioning and inspection process;

TEAC

**Teach-in:** self-detection process necessary to detect the target's reference image used as comparison during the successive inspection;

SAVE

**Save:** allows to memorise inspection and automatically enter in the *Run mode*;

NETS

**Network:** allows to access communication parameters;

DISP

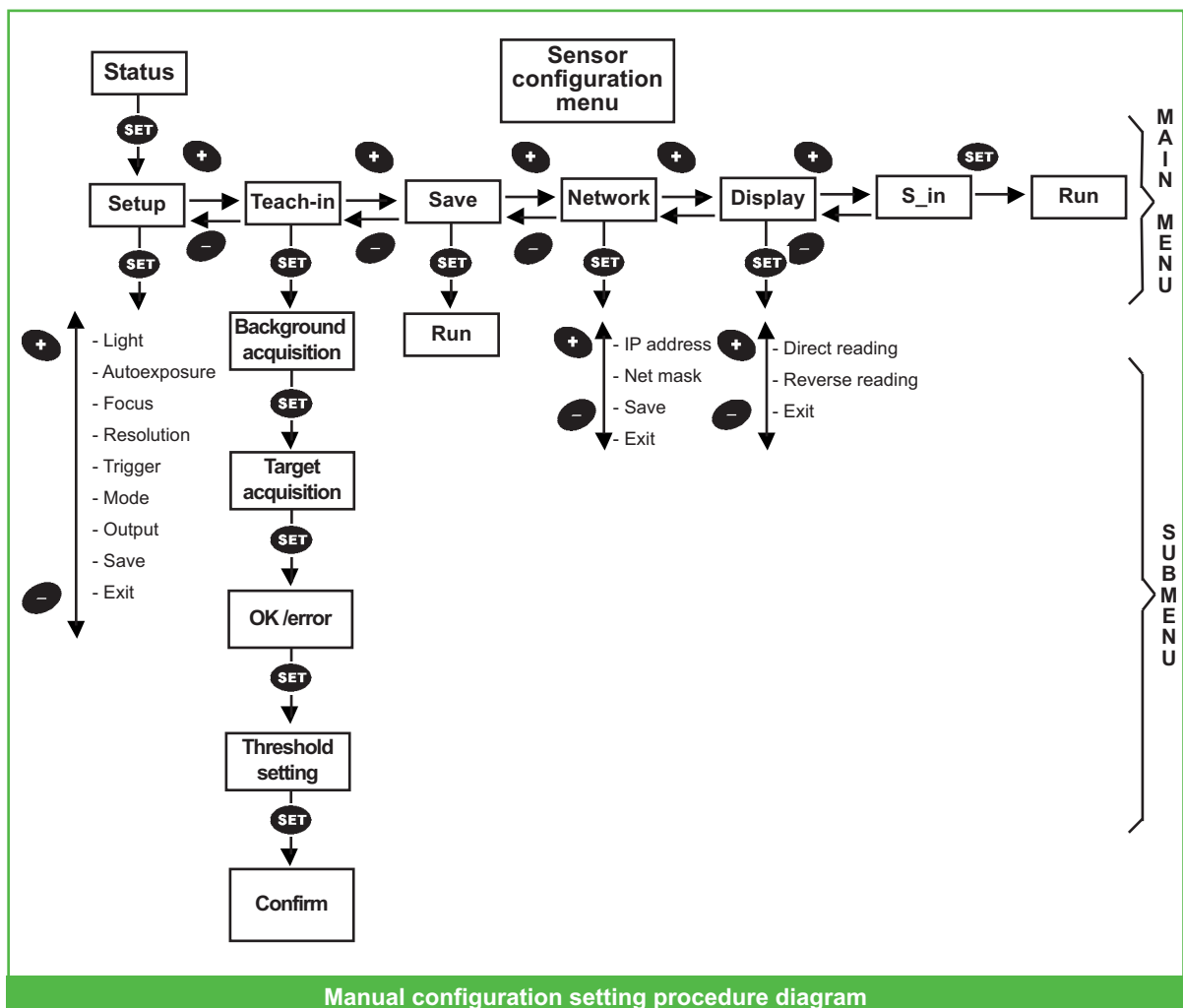
**Display:** allows to change text orientation on the display;

S\_IN

**Start inspection:** allows to return to the *Run mode*, resetting the previous configuration (quit without save);

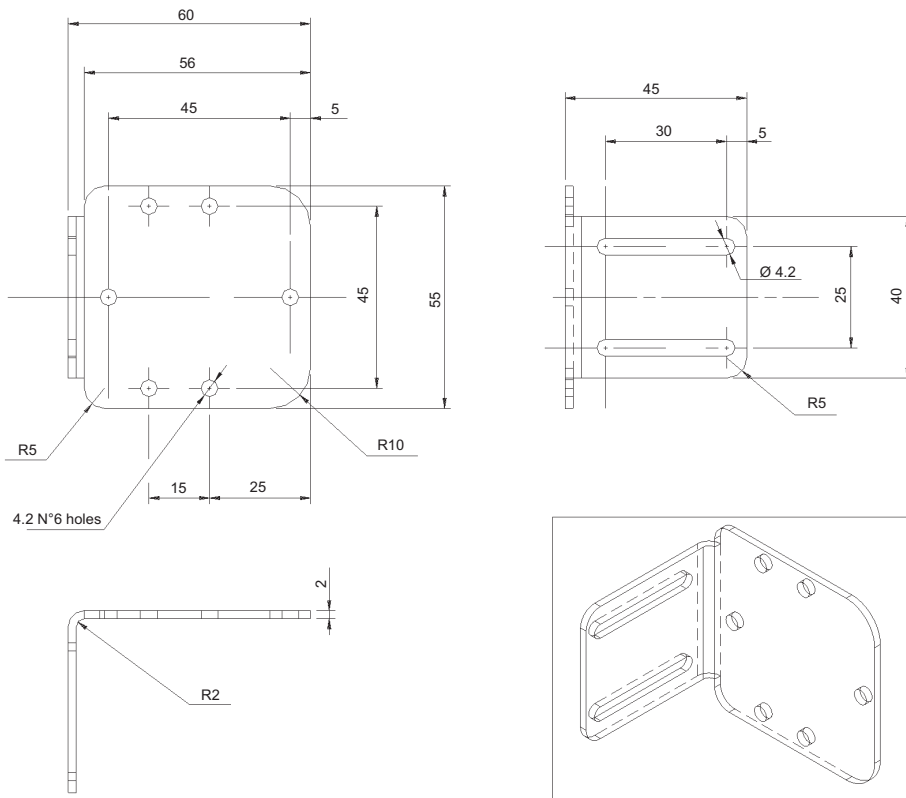
RUN

**Run inspection:** sensor runs inspection.

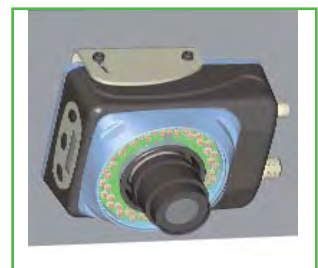
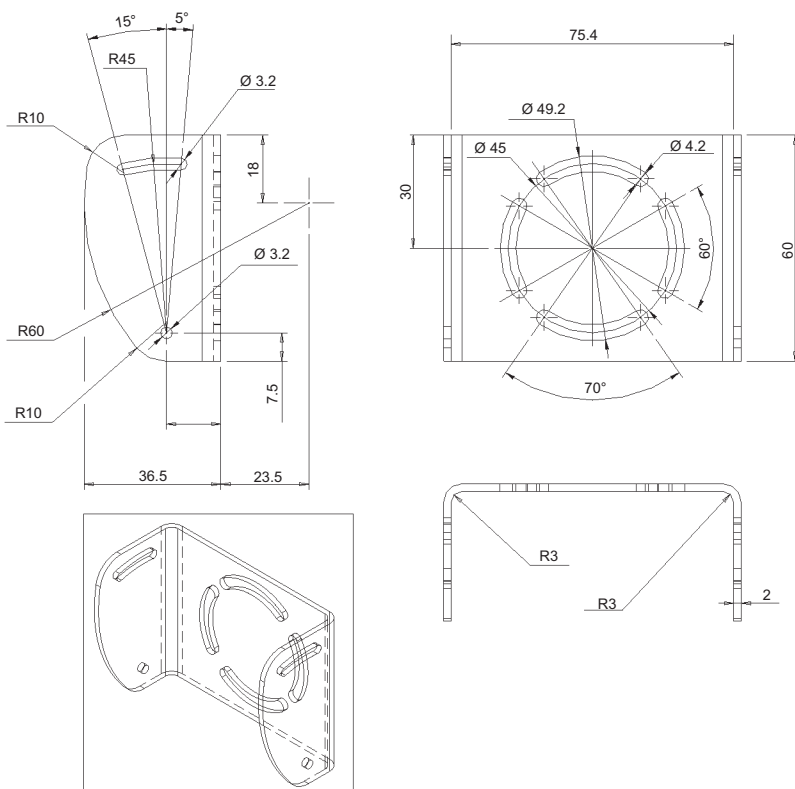


## ACCESSORIES

**ST-5047 linear adjustable fixing bracket**



**ST-5048 angled adjustable fixing bracket**





## ILLUMINATORS

### ILLUMINATION IN ARTIFICIAL VISION

Illumination has to be carefully studied to optimise the target object and background contrast in order to capture the image in the best possible way.

Hence lighting becomes fundamental as the object must be constantly illuminated to minimise ambient light effects and consequent changes.

Physical protections and shields can be used to avoid ambient light interferences on the object target, so that lighting brightness becomes less critical.

**DATASENSOR** offers different types of illuminators, in order to satisfy many different application needs.

Top, Back and Ring illuminators are available on request both in continuous and strobe versions.

Strobe lighting is a pulsed illumination source which uses LEDs that generate a short burst of high intensity light. It is very useful in presence of high-speed moving target objects as the image sensor exposure time becomes very low. Strobe lighting requires an external control module that is available in the accessory range.

### SIL ILLUMINATOR SERIES

The **SCS1** Smart Camera offers a rich range of solid-state illuminators, thanks to the experience of **DATASENSOR OPTICS**, business unit specialised in the design, development and manufacturing of optic and lighting systems.

The illuminators of the **SIL** series are fully-integrated devices. The optics, electronics and LED driving section are all built-in the sturdy aluminium housing, easing installation and use.

Different versions are available:

- **SIL LINE**
- **SIL AREA**
- **SIL BACK**
- **SIL RING**
- **SIL SPOT**

Designed to provide low angle of incidence illumination over a long, wide area, the **SIL LINE** version produces a very high, non-diffused illumination.

The **SIL AREA** version present similar featurea and is thus recommended for large rectangular areas.

The **SIL RING** model represents an axial light source for general purpose applications and is available also in a strobed version for rapidly moving objects.

The **SIL BACK** model supplies rectangular backlight diffused illumination offering a clear contrast of the external contour and highlights all holes.

Object details are best underlined by the **SIL SPOT** version that concentrates high intensity illumination focussed on a limited area.

The electrical connection is eased thanks to M8 4-pole connectors.

The standard versions emit red light, but on request blue, green, white or infrared versions are available.



**Note:** please refer to the 'SIL industrial illuminator series' datasheet for more information relative to the specifications of the SIL illuminators .

## MODEL SELECTION TABLE

MODEL	INTERFACE	ILLUMINATOR	ORDINE N°
SCS1-12-PPZ2-ILR	RS232	integrated	959901000
SCS1-12-PPZ4-ILR	RS485	integrated	959901010
SCS1-12-PPHH-ILR	2 inputs	integrated	959901020
SCS1-12-PPZ2-NIL	RS232	external	959901030
SCS1-12-PPZ4-NIL	RS485	external	959901040
SCS1-12-PPHH-NIL	2 inputs	external	959901050

## ACCESSORIES SELECTION TABLE

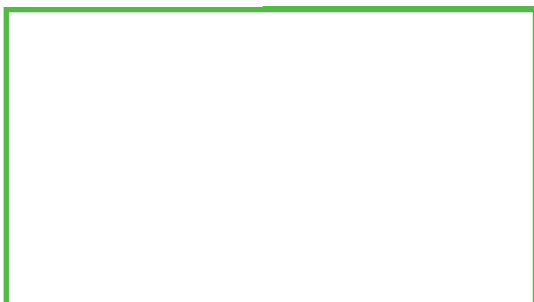
MODEL	DESCRIPTION	ORDER N°
SIL-LINE RED FLOOD	Linear smart illuminator, red light with integrated LED driver	95A901180
SIL-AREA RED FLOOD	Rectangular smart illuminator, red light with integrated LED driver	95A901190
SIL-RING RED FLOOD	Ring smart illuminator, red light without integrated LED driver	95A901200
SIL-BACK RED FLOOD	Backlight smart illuminator, red light without integrated LED driver	95A901210
SIL-SPOT RED FLOOD	Focussed smart illuminator, red light with integrated LED driver	95A901220
SIL-SPOT-NA RED FLOOD	Focussed smart illuminator, red light without integrated LED driver	95A901230
SIL-LINE WHITE FLOOD	Linear smart illuminator, white light with integrated LED driver	95A901260
SIL-AREA WHITE FLOOD	Rectangular smart illuminator, white light with integrated LED driver	95A901270
SIL-RING WHITE FLOOD	Ring smart illuminator, white light without integrated LED driver	95A901280
SIL-BACK WHITE FLOOD	Backlight smart illuminator, white light without integrated LED driver	95A901290
SIL-SPOT WHITE FLOOD	Focussed smart illuminator, white light with integrated LED driver	95A901300
SIL-SPOT-NA WHITE FLOOD	Focussed smart illuminator, white light without integrated LED driver	95A901310
LD1	LED driver for SIL-SPOT-NA and SIL BACK	95A901240
LD2	LED driver for SIL-RING	95A901250
SCS-B1-02-G-01	1 m cable for illuminator, M8 4-pole connector	95A901070
SCS-CV-RJ45D-02	Ethernet cable direct 2 m *	95A901030
SCS-CV-RJ45C-03	Ethernet cable crossed 3 m **	95A901040
CS-A1-06-B-03	M12 8-pole connector with 3 m unshielded cable	95ACC2230
CS-A1-06-B-05	M12 8-pole connector with 5 m unshielded cable	95ACC2240
CS-A1-06-B-10	M12 8-pole connector with 10 m unshielded cable	95ACC2250
SCS-LE-V06-C-V	6 mm C-mount optics	95A901080
SCS-LE-V08-C-V	8 mm C-mount optics	95A901090
SCS-LE-V12-C-V	12 mm C-mount optics	95A901100
SCS-LE-V16-C-V	16 mm C-mount optics	95A901110
SCS-FILTER-620	optic filter 620 nm	95A901140
SCS-LASER POINTER	laser pointer for alignment	95A901050
SCS-ST5047	linear adjustable fixing bracket	95A901000
SCS-ST5048	angled adjustable fixing bracket	95A901020

\* direct Ethernet cable for SCS and LAN network connection

\*\* crossed Ethernet cable for SCS and PC connection

CTi Automation - Phone: 800.894.0412 - Fax: 208.368.0415  
 Web: [www.ctiautomation.net](http://www.ctiautomation.net) - e.mail: [info@ctiautomation.net](mailto:info@ctiautomation.net)

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# SMART CAMERA SENSORS

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